**Project Title:**  Multiple Refuge Bat Inventory, GB/GNLCC

**Primary Responsible Individual:**  Jenny Barnett, Zone Inventory and Monitoring Biologist;
Jenny_barnett@fws.gov;  509-235-4723, ext 239

**Project Objectives:**  This is a cooperative project between the Upper Columbia Basin Network (UCBN) of the National Park Service I&M Program, USFWS Region 1 I&M Program (R1 I&M) and  the Great Northern LCC (GNLCC).  The project has 4 objectives:

1) Develop protocols for acoustic bat detection on National Wildlife Refuge and National park Units (sites).
2) Document the occurrence, distribution, and relative abundance of bat species on National Wildlife Refuges and National Park units (sites).
3) Provide baseline data for use in developing general monitoring strategy and assessing future impact of White-nose Syndrome.
4) Provide data in formats that are easily accessible to site managers, scientists, and the public.

**Methods:** The occurrence, distribution, and relative abundance of bats would be documented using acoustic methods.  Pettersson D500x bat detectors, designed for remote monitoring, would be deployed on participating refuges.  SonoBat software would be used to analyze sound files collected by bat detectors.  Full spectrum analysis allows Identification to species groups, or individual species in some cases.  These data can provide a relative index to abundance using a standardized metric such as bat pass, or calls per unit time.

A probabilistic sampling scheme would be used to select sample locations on participating sites.  Bats would be sampled during summer (July through September), when they are in breeding habitats and actively foraging at night.

A database would be developed to transfer bat files from remotely placed detectors to a central location for analysis.  A database would also be developed to provide raw results back to site staffs, showing species lists and relative abundance per sample site.  Other agencies and the general public could have access to general summaries of results via the GNLCC website, LC Map.

The project would encompass 2 field seasons.  Sampling design and protocols would be developed by R1 I&M, UCBN, and a statistician from GNLCC.  R1 I&M would purchase bat detectors, which would be deployed by staff and volunteers at individual refuges.  UCBN would provide detectors to park staffs.  R1 I&M and UCBN would analyze call files and prepare a final report, using data collected on both parks and refuges.    Final products would include:

1) Protocol for acoustic bat detection surveys, including sampling design and deployment guides for several types of acoustic bat detectors.
2) For each site, baseline data on bat populations, including a species list and relative abundance by species.

3) A regional database for storing and presenting acoustic bat detection data, served on the LC map site.
4) A final report detailing methods, protocols and project results.

**Implementation Timeline:**

| | 2012 | | | | 2013 | | | | 2014 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | W | SP | SU | F | W | SP | SU | F | W | SP |
| Protocol Development | ▓ | ▓ | | | | | | | | |
| Purchase equipment | | ▓ | | | | | | | | |
| Field Sampling | | | ▓ | | | | | | | |
| Raw Data Management | | | ▓ | | | | | | | |
| Sound File Analysis | | | | ▓ | | | | | | |
| Preliminary data analysis (site species lists) | | | | | ▓ | | | | | |
| Field Sampling | | | | | | | ▓ | | | |
| Raw Data Management | | | | | | | ▓ | | | |
| Sound File Analysis | | | | | | | | ▓ | | |
| Analysis and reporting | | | | | | | | | ▓ | |
| Final report - June 15, 2014 | | | | | | | | | | ▓ |

W = January, February, March
SP = April, May, June
SU = July, August, September
F = October, November, December

**Relationship to funding priorities:** This project meets 5 of the funding priorities described in the RFP, as described below.

*Inventory/baseline data collection:* Few participating refuges have documented the bat species on their refuge and none have relative abundance estimates for any bat species. Currently, bats are included on most refuge species list based on suspected occurrence from species range maps.

*Data compilation and management:* The project has a major focus on data compilation and management. I&M staff would work with the NPS and GNLCC staff to develop databases used to transfer raw bat files from the field to I&M staff for analysis and for dissemination results back to refuge staffs. National Park units would also be collecting and share bat information, making the data available to multiple agencies over a wide geographic area.

*Protocol development:* The project involves developing protocols for bat surveys. Recent advances in technology have made remote acoustic feasible, but no standard methods for using acoustic detection have been accepted. Data can be collected during road survey routes, or at sites where detectors are placed unattended for days at a time. NPS UCBN have identified bats as a vital sign, and would be developing protocols for bat monitoring. Protocol development would include identifying a sampling

scheme adequate for sampling various refuges and park units across a large landscape.  UBCN would take the lead in protocol development, assisted by R1 I&M, and a statistician from the GNLCC .

*Equipment purchase:*  This grant would be used to purchase bat detectors and accessories.  Once the project is complete, the detectors would be available for other uses.  One idea is to use data from this project to identify areas particularly rich in bat species or with sizable populations of species sensitive to white-nose syndrome.  The bat detectors could then be used for long-term remote monitoring at select sites and be available to investigate a wide variety of questions about bat populations.

*Evaluate effects of stressors (climate change, disease):*  White-nosed syndrome (WNS) is a new and substantial threat to bat populations.  Since discovered in New York in early 2006, the disease has caused very high mortality in hibernating bats.  The disease has rapidly moved east, and by early 2011, WNS was confirmed in Indiana and Kentucky.  Most experts believe it is just a matter of time before the disease comes to the Pacific Northwest.  Compared to eastern bat species, western bats tend to hibernate in small groups in dispersed hibernacula.  This would make monitoring WNS impacts at hibernacula more difficult, and increases the importance of baseline monitoring during different seasons.  Acoustic monitoring during summer in New York State has documented a marked decrease in summer activity in little brown bats, a species with significant winter mortality due to WNS.

**Project Justification:**   The project is truly regional in scope, encompassing sites in eastern Washington and Oregon, Idaho, and western Montana.  Most refuges in the eastside zone lack basic information on bats.  Only Turnbull, Sheldon, and Malheur have reliable bat species lists.  The hoary bat is a focal species on Little Pend Oreille Refuge and 8 refuges identify the need for bat inventory in their CCP objectives.  No refuges have information on relative abundance of bats.  Specifically, the project meets several evaluation criteria outlined in the RFP.

The project has direct connection to **CCP**s for at least 9 refuges.   Three refuges have identified inventory of little-know species, including bats, as an objective.  Five refuges have identified cliff and rimrock areas as important habitat types, yet know little about the species inhabiting them.  In general, bats are listed as a species group for which more information is needed.

The project clearly meets the ***science needs of multiple refuges***.  The project would provide baseline population data on a little-known resource, with a new stressor looming on the horizon.  A regional, multiple agency approach to sampling would allow for regional inference and provide a landscape level view of bat populations as well as individual sites.

The project meets ***management priorities of multiple agencies***.  Bats are a Vital Sign in the NPS Upper Columbia Basin Network.  As such, NPS ecologists are tasked with developing protocols for monitoring bat populations.  Both Washington Department of Fish and Wildlife and Idaho Department of Fish and Game are initiating bat surveys and surveillance due to WNS.

A goal of the Great Northern LCC is to "coordinate, facilitate, promote, and add value to large landscape conservation to build resource resilience in the face of climate change and other landscape-level stressors. They have invested in LC Map, a comprehensive tool to create, manage, document, and analyze geospatial data. Their commitment to data management for this project speaks to how this project supports their goals.

**Data Use:** Data would provide baseline species occurrence and relative abundance of bat species. The data served on the LC Map site would be available to multiple partners, increasing data sharing. States would have ready access to the data for WNS monitoring and planning. The project would fulfill the baseline data needs for refuges with those need identified in their CCP. Baseline data prior to WNS arrival in the region is critical for evaluating the impact of that new stressor.

**Statistical/GIS assistance needed:** GIS layers for participating refuges would be needed. GIS would be used in probabilistic sample selection, most likely using a Generalized Random Tessellation Stratified (GRTS) procedure.

**Requested Amount:** Money would be used to purchase 9 bat detectors and accessories. Accessories include weather protection, external microphones, batteries and cables, and enough extra data cards and batteries to allow service of remotely-placed detectors with a minimum of site staff time. The budget also includes cost for shipping detectors to field sites for deployment.

Total Amount requested: **$33,500**